they brought out the broad features of the subject, and to reduce the sources of error he had limited himself to indicating four grades of mean annual humidity, the upper limits of which were, respectively, 50 per cent (very dry), 65 per cent, 80 per cent, and 100 per cent (very damp). The relative humidity over the ocean might exceed 80 per cent, but in certain regions (horse latitudes) it was certainly much less, and in a portion of the Southern Pacific it seemed not to exceed 65 per cent, a feature seemingly confirmed by the salinity of that portion of the ocean which exceeded 3.6 per cent.

His second chart exhibited the annual range of humidity, viz, the difference between the driest and the dampest months of the year. In Britain, as in many other parts of the world, where the moderating influence of the ocean was allowed free scope, this difference did not exceed 16 per cent, but in the interior of the continents it occasionally exceeded 45 per cent, spring or summer being exceedingly dry, whilst the winter was excessively damp, as at Yarkand, where a humidity of 30 per cent in May contrasted strikingly with a humidity of 84 per cent in December.

This great range directed attention to the influence of temperature (and of altitude) upon the amount of relative humidity, for during temperate weather we were able to bear a great humidity with equanimity, whilst the same degree of humidity accompanied by great heat, such as is occasionally experienced during the "heat terms" of New York and recently in London, may prove disastrous to men and beasts. Hence, combining humidity and temperature, the author suggested mapping out the earth according to sixteen *hygrothermal types*, as follows:

1. Hot (temperatures 73° and over) and very damp (humidity 81 per cent or more): Batavia, Camaroons, Mombasa.
2. Hot and moderately damp (66–80 per cent): Havana, Calcutta.
3. Hot and dry (51–65 per cent): Bagdad, Lahore, Khartum.
4. Hot and very dry (50 per cent or less): Disa, Wadi, Halfa, Kuka.
5. Warm (temperature 58° to 72°) and very damp: Walwisch Bay, Arica.
6. Warm and moderately damp: Lisbon, Rome, Damascus, Tokio, New Orleans.
7. Warm and dry: Cairo, Algiers, Kimberley.
8. Warm and very dry: Mexico, Teheran.
9. Cool (temperature 33° to 57°) and very damp: Greenwich, Cochambo.
10. Cool and moderately damp: Vienna, Melbourne, Toronto, Chicago.
11. Cool and dry: Tashkent, Simla, Cheyenne.
12. Cool and very dry: Yarkand, Denver.
13. Cold (temperature 32° or less) and very damp: Ben Nevis.
14. Cold and moderately damp: Tomsk, Pikes Peak, Polaris, House.
15. Cold and dry.
16. Cold and very dry: Pamir.

The actual mean temperature of the earth amounted, according to his computation to 57° F., and this isotherm, which separated types 8 and 9, also divided De Candolle's "Mikrothermes" from the plants requiring a greater amount of warmth.

The author fully illustrated his paper by a number of diagrams giving the curves of the temperature, rainfall, and humidity, and also by a chart of the world exhibiting the number of rainy days.

J. BROWN HICKLIN.

We regret to announce the death of Mr. J. Brown Hicklin on March 21, 1901. Mr. Hicklin entered the Weather Bureau on February 1, 1897, by transfer from the Government Printing Office. His entire service in the Bureau was performed at the Denver, Colo., station. The reports from the official in charge at that point were invariably favorable to Mr. Hicklin. He was industrious, painstaking, and reliable in every respect.—*D. J. C.*

NORMALS FOR MANILA.

The Manila Observatory has lately published, in a convenient pamphlet form, its normal climatological data. The pressure, temperature, and humidity data are based upon the years 1883–1898, during which period hourly observations have been made night and day. The rainfall data represent the longer period, from 1865–1898. The barometric record has been reduced to sea level, but it is not definitely stated that the mean values have been reduced to standard gravity. The latitude of Manila is 14° 35′ N., and the mean height of the barometer is 759.31 millimeters, or 29.89 inches, the correction for gravity is, therefore, —1.77 millimeters, or —0.070 inch, which correction is probably still to be applied to the figures given in the table below in order to conform to the rules of the International Meteorological Congress and Committee.

TABLE 1.—*Normal atmospheric pressures at Manila*, 1883–1898.

Month.	Mean.	Highest mean.	Lowest mean.	Absolute maximum.	Absolute minimum.
	Inches.	*Inches.*	*Inches.*	*Inches.*	*Inches.*
January	29.97	30.06	29.91	30.21	29.71
February	29.98	30.04	29.89	30.19	29.68
March	29.95	30.02	29.85	30.15	29.65
April	29.90	29.95	29.88	30.06	29.67
May	29.86	29.92	29.82	30.03	29.88
June	29.85	29.88	29.81	30.02	29.59
July	29.82	29.87	29.76	30.00	29.48
August	29.83	29.87	29.80	30.02	29.53
September	29.88	29.90	29.77	30.03	29.28
October	29.88	29.93	29.82	30.05	29.45
November	29.90	29.98	29.81	30.16	29.27
December	29.96	30.02	29.88	30.16	29.54
Annual	29.89	30.06	29.76	30.21	29.28

TABLE 2.—*Normal temperatures at Manila*, 1883–1898.

Month.	Mean.	Highest mean.	Lowest mean	Absolute maximum.	Absolute minimum.
	°*F.*	°*F*	°*F.*	°*F.*	°*F.*
January	77.0	78.4	74.5	93.0	62.1
February	77.7	79.5	75.9	95.7	61.0
March	80.4	81.9	79.0	95.9	63.3
April	82.9	84.9	81.1	99.0	66.0
May	83.3	86.5	81.7	100.0	71.1
June	82.0	85.1	80.6	97.0	70.9
July	80.8	81.5	79.0	94.8	70.0
August	80.8	81.9	79.5	94.3	69.1
September	80.4	81.7	79.3	93.7	70.5
October	80.4	81.5	79.0	94.8	68.7
November	79.0	80.2	77.7	92.1	64.9
December	77.4	78.8	75.4	91.9	60.8
Annual	80.2	86.5	74.5	100.0	60.8

TABLE 3.—*Normal atmospheric moisture at Manila*, 1883–1898.

Month.	Relative humidity.			Vapor pressure		
	Mean.	Maximum	Minimum.	Mean.	Absolute maximum.	Absolute minimum.
	Per ct.	*Per cent.*	*Per cent.*	*Inches.*	*Inches.*	*Inches.*
January	77.7	100.0	40.0	0.713	1.024	0.469
February	74.1	100.0	33.0	0.697	0.992	0.382
March	71.7	100.0	31.5	0.736	1.142	0.390
April	70.9	100.0	33.0	0.784	1.138	0.472
May	76.9	100.0	32.0	0.866	1.122	0.508
June	81.5	100.0	36.0	0.886	1.067	0.587
July	84.9	100.0	52.5	0.882	1.075	0.677
August	84.4	100.0	52.0	0.882	1.083	0.689
September	85.6	100.0	51.0	0.886	1.071	0.614
October	82.6	100.0	46.0	0.850	1.051	0.559
November	81.6	100.0	39.0	0.799	1.016	0.441
December	80.7	100.0	39.5	0.752	1.055	0.458
Annual	79.4	100.0	31.5	0.811	1.142	0.382

TABLE 4.—*Normal rainfall at Manila*, 1865–1898.

Month.	Mean.	Highest mean.	Lowest mean.	Greatest Daily.
	Inches.	*Inches.*	*Inches.*	*Inches.*
January	1.198	7.685	0.020	7.327
February	0.418	1.559	0.000	1.496
March	0.736	3.945	0.000	3.362
April	1.142	5.370	0.000	1.724
May	4.197	10.114	0.000	6.567
June	9.622	25.807	0.976	9.949
July	14.567	31.882	5.276	11.421
August	13.866	43.134	5.150	8.917
September	14.925	57.862	2.000	13.228
October	7.536	23.217	1.555	6.772
November	5.126	15.662	1.173	7.110
December	2.134	13.658	0.006	3.543
Annual	75.457	57.862	0.000	13.228

TABLE 5.—*Mean winds, Manila*, 1865–1898.

(As read off by the Editor from Fr. Algué's diagrams.)

Month.	Resultant direction.	Relative frequency.			
		Direction.	Nov.-May.	June-Oct.	Annual.
	°		*Per cent.*	*Per cent.*	*Per cent.*
January	n. 50 e.	n.	8	4	7
February	n. 80 e.	nne.	7	4	6
March	s. 80 e.	ne.	9	5	7
April	s. 45 e.	ene.	5	3	4
May	s. 20 e.	e.	11	5	8
June	south	ese.	9	4	6
July	s. 40 w.	se.	6	4	5
August	s. 45 w.	sse.	2	3	3
September	s. 45 w.	s.	2	6	3
October	s. 80 e.	ssw.	2	9	5
November	n. 30 e.	sw.	5	17	9
December	n. 20 e.	wsw.	7	9	7
		w.	6	6	5
Annual	s. 45 e.	wnw.	2	2	2
		nw.	2	3	2
		nnw.	3	2	2
		n.	8	4	7
Resultant			n. 70.5° e.	s. 32.7° w.	s. 85.7° e.

THE NEW PHILIPPINE WEATHER SERVICE.

As is well known, the Observatory at Manila has been maintained for many years by the Jesuit Fathers under the Spanish administration, and embraced the subjects of astronomy, seismology, and meteorology. About 1894, Father Joseph Algué was transferred from Havana to Manila, and within the next few years distinguished himself by his activity in the study of typhoons. He subsequently became the director of the observatory, and as such, in 1899, had occasion to visit Washington, D. C., on behalf of the first Philippine Commission (of which Professor Schurman was president) here he remained a year superintending the publication of his extensive report to the commission on the climatology and geography of the Philippine Archipelago. The original Spanish edition of this report is already published, and the English summary will appear in the second volume of the commission's report to Congress, dated January 31, 1900, and published as Senate Doc. No. 138, Fifty-sixth Congress, first session.

Early in 1900, in an interview with the Secretary of Agriculture, Father Algué proposed that the United States should organize a meteorological system for the Philippines, placing it in charge of the Chief of the Weather Bureau, who should make the Manila Observatory the headquarters of the Philippine service. On the other hand, Professor Moore urged that it would be best that the Philippine system should be independent of the United States Weather Bureau; that it should be supported by the funds of the Philippine government rather than those of the United States; that Father Algué himself should be the director, and that the United States Weather Bureau would cooperate and render all the assistance possible. Professor Moore's plan was agreed to by Secretary Wilson, and adopted by the Philippine Commission, Secretary Wilson stating, however, that as soon as enough of the islands of the Pacific are connected by cable, it will be advisable for the United States Government to organize an extensive storm-warning system with the Philippine service incorporated under Federal direction.

Father Algué, during the rest of his stay in the United States, consulted with the various officials of the Weather Bureau and studied its methods. Since returning to Manila he has organized the Philippine system on lines parallel to those that characterize the Weather Bureau. As far as practicable, the same apparatus and methods have been adopted and the following extract from his letter to Professor Moore, dated February 17, shows the rapid progress that is being made:

MY DEAR PROFESSOR:

Most of the instruments intended for the first class stations of the Philippine weather service are at hand, and a few will be made in our mechanic's shop. The United States Philippine Commission[1] has established civil government in some provinces, and there will be a chance to open a few stations on the islands before the coming of the full typhoon season in May. I expect that by that time there will be some twenty telegraphic stations scattered over the islands: everything is done in accordance with the plan approved by you about the end of March, 1900. If this be entirely executed, as you suggested, here will be one of the finest meteorological and seismical *reseau* (network of stations) in existence in any colony over the world.

The mail will bring you a new pamphlet recently published on a typhoon felt in Manila about the 8th of September, 1900 (the very day of the Galveston cyclone.) The pamphlet proved to be very welcome in Manila and in Asia. I confine myself to quoting to you only one instance, viz, the following letter which was received yesterday:

UNITED STATES NAVAL STATION,
CAVITE, PHILIPPINE ISLANDS,
February 15, 1901.

"*The Director Observatorio de Manila:*

DEAR SIR: I beg to thank you for a copy of your most interesting publication on the storm which prevailed in this vicinity on the 8th of September, last. While I was not in command of this station on that date, I was informed by my predecessor how extremely valuable the telegrams from the Manila Observatory were in guiding him in his disposition of the numerous yard launches and other craft.

With renewed expressions of my regard for the Observatorio de Manila, believe me,

Yours, very respectfully,
F. HANFORD, *Commander, U. S. N.*,
Commandant, United States Naval Station, Cavite, P. I."

WEATHER BUREAU MEN AS INSTRUCTORS.

Mr. H. B. Boyer, Local Forecast Official at Savannah, Ga., states that he has met with some success in stimulating public interest in Weather Bureau work. On several occasions Prof. Otis Ashmore delivered lectures on meteorology to the teachers of the public schools; Prof. T. S. Lucas, of the High School, has been giving some instruction as to the lessons taught by the weather map; Prof. D. C. Suggs, of the Georgia State Industrial College (colored), has also requested maps as an aid to his classes in the study of physical geography. Applications for maps have been received from the Southern Normal Institute, Douglas, Ga., and the teacher of a school in Whitley, Ga. A cordial invitation was extended by Mr. Boyer to the public school teachers, which resulted in high school and grammar school classes visiting the office, where the instruments were shown and explained.

Mr. Alfred F. Sims, Local Forecast Official, Albany, N. Y., lectured on Monday, March 18, at the Albany High School, on the "Musings of a meteorologist." On March 26 he lectured on the growth of the globe and its atmosphere, under the title, "Glimpses into nature's laboratory."

Mr. Charles Stewart, Observer Weather Bureau, Spokane, Wash., lectured, January 29, to the students of the Blair Business College; February 13 at St. Stephen's School, and March 20 at Gonzaga College.

Mr. S. M. Blandford, Section Director at Boise, Idaho, lectured to the instructors and students at St. Margaret's Academy, Boise, Idaho, on the 16th of March, on barometric pressure, precipitation, temperature, clouds, and wind movement in cyclonic and anticyclonic areas.

DUST STORMS AND RED RAIN.

In previous numbers of the MONTHLY WEATHER REVIEW we have described several dust storms; a general article on that subject, by Prof. J. A. Udden, was published in the Popular Science Monthly for September, 1896. In this article

[1] That of which Judge Taft is president.